

*PIPER COMMUTATUM* (PIPERACEAE), THE CORRECT NAME FOR A  
WIDESPREAD MEXICAN AND MESOAMERICAN SPECIES

JOSÉ MANUEL RAMÍREZ AMEZCUA

Instituto de Ecología, A.C., Centro Regional del Bajío, Apdo. postal 386, 61600  
Pátzcuaro, Michoacán, México.

Author for correspondence: ramirezamezcuaajm@gmail.com

ABSTRACT

*Piper sanctum*, long treated as a distinct species, is here reduced to a synonym of *P. auritum*, which is a popularly known plant in Mexico. The oldest binomial for the species to which the name *Piper sanctum* was misapplied is *P. commutatum*, a taxon ranging from central Mexico south to Costa Rica and occurring in cloud forest, tropical perennial forest, tropical subdeciduous forest and humid canyons in tropical deciduous forest, at elevations from sea level to 2050 m. Synonyms of *Piper commutatum* include: *P. papantlense*, *P. nudum*, *P. diandrum*, *P. membranaceum*, and *P. venulosum*, among others.

Key words: Central America, Mexico, nomenclature, *Piper auritum*, *P. commutatum*, *P. sanctum*, synonymy, types.

RESUMEN

*Piper sanctum*, durante mucho tiempo reconocido como una especie distinta, se reduce aquí a sinónimo de *P. auritum*, la cual es una planta popularmente conocida en México. El nombre más antiguo para el cual el binomio *Piper sanctum* ha sido mal aplicado es *P. commutatum*, un taxon distribuido del centro de México al sur hasta Costa Rica, ocurriendo en bosque mesófilo, bosque tropical perennifolio, bosque tropical subcaducifolio y cañadas húmedas en bosque tropical caducifolio, a elevaciones que van desde el nivel del mar hasta los 2050 m. *Piper commutatum* incluye varios nombres como sinónimos: *P. papantlense*, *P. nudum*, *P. diandrum*, *P. membranaceum*, y *P. venulosum*, entre otros.

Palabras clave: Centroamérica, México, nomenclatura, *Piper auritum*, *P. commutatum*, *P. sanctum*, sinonimia, tipos.

The genus *Piper* L., with approximately 2000 species and a pantropical distribution (Quijano-Abril et al., 2006), is one of the giant genera of Angiosperms (Frodin, 2004). The majority of species are found in the Neotropics, where the genus ranges from northern Mexico and the Greater Antilles southward to Chile and Argentina. In the first classifications of *Piper*, the genus was divided into several segregate genera which today are no longer recognized. The first major treatment was Kunth's *Bemerkungen über die Familie der Piperaceen* (1839). Shortly thereafter, Miquel adapted and modified Kunth's classification in *Systema Piperacearum* (1843-1844). All segregate genera were assumed into *Piper* by Casimir de Candolle, who prepared the most complete treatment in Alphonse de Candolle's *Prodromus* (1869), in which only 398 species were recognized. However, an important taxonomic key for the whole genus, *Piperacearum Clavis Analytica*, was posthumously published (de Candolle, 1923). Since this monograph, a number of important taxonomic treatments have been published, including revisions of several subgeneric groups (e.g., Trelease, 1921, 1935; Bornstein, 1989; Tebbs, 1989, 1990, 1993). In addition, there are a number of valuable regional floristic accounts, such as the treatments of the genus in northern South America (Trelease and Yuncker, 1950) Guatemala, (Standley and Steyermark, 1952) Argentina, Bolivia, and Chile (Yuncker, 1953), Costa Rica (Burger, 1971), Brazil (Yuncker, 1972, 1973), Venezuela (Steyermark, 1984), Nicaragua (Callejas, 2001), Cuba (Saralegui-Boza, 2004), Honduras (Bornstein and Coe, 2007), and the state of Michoacán, Mexico (Ramírez, 2013). Also noteworthy is a recent molecular phylogenetic study of the genus (Jaramillo et al., 2008).

As would be expected with such a large taxon, the nomenclatural and taxonomic history of *Piper* is complex and challenging. This is primarily due to three reasons. First, the flowers are small and morphologically homogeneous across the genus; second, many species have been described on the basis of characteristics of little taxonomic value or sterile specimens; and third, many new species have been proposed for plants occurring in different political regions, despite their similarity with previously described species from other regions (Bornstein, 1989). One problematic name is *Piper sanctum* (Miq.) Schltldl. ex C. DC. This was first described as *Artanthe sancta* in 1845, based on specimens housed in the Schlechtendal Herbarium, now at HAL (Miquel, 1845). The material used is referred by Miquel as collection *Schiede 1105*, from Atlacomulco in the Mexican state of Veracruz. The description is relatively incomplete, and the cited material does not have inflorescences. In fact, the type collection consists of a single leaf with no other structures (Fig. 1) and corresponds precisely with the morphological description provided in the protologue. The combination *Piper sanctum* was subsequently made by C. de

Candolle (1869), citing the Miquel binomial but with a mistake in the collection number (*Schiede 105*). Furthermore, I am able to confirm that he indeed saw *Schiede 1105*, because in the herbarium G-DC there is a calc, made on translucent paper, which correspond to the leaf shape of the species. That tracing was made by de Candolle himself, as he did for many species, (available in C-DG, G00322955), and is provided with the number *1105*.

*Piper sanctum* was subsequently recognized by Standley (1920), accompanied by many common names and reported from the Mexican states of Oaxaca, Tabasco and Veracruz. Tebbs also treated it as a distinct species (1993) and listed its distribution as ranging from Mexico to Costa Rica. In addition to its basionym, the latter author treated various binomials as synonyms: *Piper papantlense* C. DC., *P. diandrum* C. DC., *P. venulosum* Trel., *P. dissimulans* Trel., and *P. heterophlebium* Trel. ex Standl. Apparently Tebbs did not see original material of *Piper sanctum*, as she cited the type as “*Schiede 105* [sic] (?B, holotype).” However, while searching in the database and realizing an extensive revision in the herbarium of the Botanisches Museum Berlin-Dahlem (B) in December 2014, I did not find any material collected by Schiede with this number, and I believe that she was perpetuating C. de Candolle’s error.

In conjunction with a revision of the genus in the Mexican state of Michoacán, I reviewed the types of many of the taxa treated by Tebbs, including those of *Piper sanctum* and the species that she listed as its synonyms. Much to my surprise, I encountered that Tebbs’ application of the name was erroneous, and that the type clearly corresponds to the earlier described *P. auritum* Kunth. *Piper auritum* ranges from Mexico to Colombia and the Antilles, occurring commonly along edges of rivers in cloud forest, tropical perennial forest, tropical subdeciduous forest and humid canyons in tropical deciduous forest, at elevations from sea level to 2260 m. It also often grows beside agricultural crops or is cultivated in domestic gardens. Is very common in Veracruz, where it is widely employed in traditional medicine and the preparation of various culinary dishes. It has many common names in Spanish, including “Acuyo,” “Hoja de Aján,” “Hoja Santa,” and “Hierba Santa”. The word “Santa” means holy in Spanish, as does Miquel’s Latin species epithet “sancta,” and undoubtedly, he choose the specific epithet in reference to its common name in Veracruz. Apparently, Tebbs did not take into consideration the protologue of *Artanthe sancta*, and its new combination of *Piper sanctum*, which clearly indicate that the leaves are membranaceous, punctate pellucid, puberulent along the veins and margin, and with five secondary nerves all originating along the middle part of the leaf (pinnatinerved):

“foliis membranaceis pellucido-punctatis utrinque subtus praesertim in nervis et secus margines puberulis rotundato-cordatis... costis usque ad 1/2 alt. utrinque” (Miquel 1845); “foliis tenuiter membranaceis pellucido-punctatis utrinque praesertim subtus ad nervos et secus margines puberulis rotundato-cordatis... Usque nervos utrinque 5 supremos ad apicem ductos infimos e basi solutos mittente” (de Candolle, 1869).

The synonyms recognized by Tebbs, in contrast, have non-membranaceous leaves that are glabrous along the veins and margin and have seven to nine secondary nerves, all originating from the base of the leaf (palmatinerved). Since this error, a number of authors have followed her misapplication of the name *Piper sanctum* (e.g., Callejas, 2001; Bornstein and Coe, 2007; Jaramillo et al., 2008).

*Piper auritum* has dimorphic leaves, as described in detail in the description below. Those of the sympodial axis are different from those of the monopodial axis. It is worth mentioning that the leaf of the type specimen of *Piper sanctum* is from the monopodial axis, whereas the leaves of the type specimens of *P. auritum* are from the sympodial axis. However, there is no doubt that both specimens represent the same species.

The oldest binomial for the species to which Tebbs misapplied the name *Piper sanctum* is *P. commutatum* Steud., the holotype of which is a collection of *Schiede s.n.*, from near Papantla, Veracruz (Fig. 2), housed in HAL. It is worth noting that *Piper commutatum* was published as a new name for *Steffensia plantaginea* Kunth, because a new combination was not possible in *Piper* due to the earlier binomial *Piper plantagineum* Lam. It ranges from central Mexico to Costa Rica, occurring in cloud forest, tropical perennial forest, tropical subdeciduous forest, and humid canyons in tropical deciduous forest, at elevations from sea level to 2050 m.

*PIPER COMMUTATUM* DIFFERS FROM *P. AURITUM* AS INDICATED BY  
THE FOLLOWING KEY:

- a Prophylls 0.5-1 mm long, hidden by the sheathing petiole. Petiole sheathing, 4-9 cm long. Leaf blade oblong-elliptic to elliptic-ovate, 13-45 cm long; base asymmetrical in sympodial leaves, cordate to deeply auriculate, the biggest lobe half or completely overlapping the petiole; pinnately veined with 8-16 secondary veins; ciliate and minutely pubescent on both surfaces. Inflorescences 12-28(-35) cm long. Fruits trigonous in cross section ..... *Piper auritum*
- b Prophylls 6-30 mm long, not hidden by the petiole. Petiole vaginate at the base, 1.5-3.5 cm long. Leaf blade broadly ovate or oblong-lanceolate to elliptic, 6-19

cm long; base symmetrical in sympodial leaves, obtuse to rounded, sometimes cordate in monopodial leaves; palmately veined with 3-7 veins; non ciliate and glabrous on both surfaces. Inflorescences 6-10(-22) cm long. Fruits round to oblong in cross section ..... *Piper commutatum*

Nomenclatural information, synonymy and description for both species are presented hereafter.

***Piper auritum*** Kunth, Nov. Gen. Sp. (Quarto ed.) 1: 54. 1815 ≡ *Schilleria aurita* (Kunth) Kunth, Linnaea 13: 713. 1839 ≡ *Artanthe aurita* (Kunth) Miq., Syst. Piperac.: 400. 1844. TYPE: “Crescit in regni Novae Hispaniae temperatis”, without date, *Humboldt & Bonpland s.n.* (holotype P!, isotype: P!). The protologue states that the collection is from near Jalapa, Veracruz, Mexico, but the types lack precise locality information.

= *Artanthe sancta* Miq., Linnaea 18: 714. 1844 ≡ *Piper sanctum* (Miq.) Schlttdl. ex C. DC. in DC., Prodr. 16(1): 330. 1869. TYPE: MEXICO, Veracruz, Atlacomulco, *Schiede 1105* (Holotype: HAL!).

= *Artanthe seemanniana* Miq., Bot. Voy. Herald [Seemann] 99, t.39. 1854. TYPE: PANAMA, Southern Darien, *Seemann 1069* (holotype: BM!).

= *Piper perlongipes* Trel., Contr. U.S. Nat. Herb. 26: 154. 1929. TYPE: COSTA RICA, Pejivalle, Cartago, *Standley & Valerio 46834* (holotype: US!).

= *P. alstoni* Trel., Ann. Missouri. Bot. Gard. 27: 287. 1940. TYPE: PANAMA, Cocle, North rim of El Valle De Antón, *Alston & Allen 1842* (holotype: ILL!; isotypes: MO!, NY!, US!).

= *Piper auritilimum* Trel., Publ. Field Mus. Nat. Hist. Bot. Ser. 9: 277. 1940. TYPE: HONDURAS, Atlántida, Rio Danto, *Yuncker, Koepper & Wagner 8763* (holotype: ILL!; isotypes: BM!, GH!, K!, MO!, NY!).

= *Piper auritilaminum* Trel., Publ. Field Nat. Hist. Bot. Ser. 9: 277. 1940. TYPE: HONDURAS, Atlántida, La Ceiba, *Yuncker, Koepper & Wagner 8263* (holotype: ILL!; isotypes: BM!, GH!, MO!, NY!).

= *Piper heraldii* Trel. var. *cocleanum* Trel., Ann. Missouri Bot. Gard. 27: 292. 1940. TYPE: PANAMA, Cocle, vicinity of El Valle, *Allen 1192* (holotype: ILL!; isotypes: GH!, ILL!, MO!, US!).

Shrubs 1-6 m high, stems green, glabrous or minutely pubescent when young, pale brownish and glabrous at maturity. Prophylls reduced, 0.5-1 mm long,



Fig. 1. Holotype of *Artanthe sancta* at HAL.

hidden in the petiole. Leaves with petiole, 4-7(-9) cm long, sheathing the young shoots, petiolar margins membranaceous, translucent, extending through 2/3 of the petiole, glabrous or minutely pubescent, with lustrose appearance; leaf blades (13-)15-27(-45) cm long, 12-21(-26) cm wide, dimorphic through the sympodial axis, monopodial leaves ovate or widely ovate, cordate and slightly auriculate at the base, with the lobes almost symmetrical; sympodial leaves elliptic-ovate, cordate to deeply auriculate at the base, with the lobes asymmetrical, the bigger lobe half or completely overlapping the petiole; obtuse to shortly acuminate at the apex, ciliate at the margin, minutely pubescent in both surfaces; pinnately nerved, veins 4-8, inconspicuously punctate pellucid; membranaceous, with a matt appearance. Inflorescences 12-28(-35) cm long, erect when young, arching in anthesis, pendulous in fruit; peduncle 4-9(-11) cm long, glabrous. Flowers sessile, subtended by triangular to orbicular bracts, 0.2 mm wide, margin densely pubescent, with white trichomes; anthers 2, 0.3 mm long, filaments of equal length, stigmas 3, sessile. Fruits obovoid, trigonous in cross section, 0.6-1 mm wide, glabrous, with a central depression.

*Piper commutatum* Steud. Nom. Bot. ed. 2. 2: 340. 1841  $\equiv$  *Steffensia plantaginea* Kunth Linnaea 13: 672. 1840  $\equiv$  *Artanthe plantaginea* (Kunth) Miq. Syst. Piperac.: 389. 1844. TYPE: MEXICO, Veracruz, Papantla, *Schiede s.n.* (holotype: HAL!).

= *Piper nudum* C. DC. in DC., Prodr. 16(1): 325. 1869. TYPE: MEXICO, “Nova Hispania”, *Sessé & Mociño s.n.* (holotype: G!, isotype: MO!)

= *Piper papantlense* C. DC. in DC., Prodr. 16(1): 338. 1869. TYPE: MEXICO, Veracruz, near Papantla, *Fischer 74* (holotype: LE!).

= *Piper membranaceum* C. DC. in DC., Prodr. 16(1): 366. 1869. TYPE: MEXICO, “Nova Hispania”, *Sessé & Mociño s.n.* (holotype: G!).

= *Piper diandrum* C.DC., Linnaea 37: 364. 1872. TYPE: MEXICO, Veracruz, Pital, vicinities of Río Nautla, *Liebmann 55* (lectotype: C!). It is worth noting that this name was based on several collections made by Liebmann (55, 58, 59, 60, 61, 62, and 63, all at C!) as well as *Bernoulli 267* (G-DC!). Tebbs (1993) indicated that *Liebmann 55* at C is the holotype. However, this is an error as this specimen needs to be considered as a lectotype according to Art. 9.9, ex. 10 of the International Code of Nomenclature (McNeill et al., 2012).

= *Piper patulum* Bertol. var. *cordifolium* Trel., J. Wash. Acad. Sci. 13: 366. 1923. TYPE: EL SALVADOR, Dept. Sonsonate, Nahulingo, *Standley 22046* (holotype: ILL; isotypes: GH!, NY!, US!).



Fig. 2. Holotype of *Piper commutatum* at HAL.



= *Piper venulosum* Trel., Contr. U.S. Natl. Herb. 26: 132. 1929. TYPE: COSTA RICA, Prov. Alajuela, San Ramón, *Brenes 14192* (holotype: US!; isotypes F, G× 2, GH!, K!).

= *Piper heterophlebium* Trel. ex Standl., Publ. Field Mus. Nat. Hist. Bot. Ser. 18: 345. 1937. TYPE: COSTA RICA, Prov. San José, El General, *Skutch 2293* (holotype: US; isotypes: A!, K!, MO, NY!, S!).

Shrubs 1-5 m tall, stems green, glabrous or glabrescent when young, pale gray and glabrous and minutely lenticellate at maturity. Prophylls (7-)10-15(-30) mm long, with a glabrous, acute apex. Leaves with a petiole, 0.3-1.5(3.5) cm long, vaginate to 1/2 of the length, petiolar margins reduced, membranaceous and translucent, extending through ca. 1 mm of the petiole, glabrous with matt appearance, leaf blades (6-)10-16(19) cm long, (2-)6-13(-15) cm wide, dimorphic through the sympodial axe, monopodial leaves ovate to broadly ovate, slightly to deeply cordate at the base, with the lobes slightly asymmetrical; sympodial leaves oblong-lanceolate to elliptic, obtuse to round, almost symmetrical at the base; moderately to long acuminate at the apex; non-ciliate at the margin, glabrous or with occasional minutely hairs on both surfaces; palmately nerved, veins (3-)5-7(-9); non-membranaceous, with lustrous appearance. Inflorescences 4-10(-14) cm long, erect when young, somewhat slender in anthesis, becoming pendulous in fruit; peduncle 6-10(-15) cm long, glabrous or with minute hairs. Flowers sessile, subtended by round to triangular bracts, 0.4-0.6 mm wide, margin sparsely to dense pubescent, with greenish to brown trichomes; anthers 2, 0.2-0.3 mm long, filaments 0.5 mm long, stigmas 3-4, sessile. Fruits obovoid, round to oblong in cross section, 1-2 mm wide, glabrous, sometimes with a central depression.

#### ACKNOWLEDGEMENTS

I thank the following herbaria for providing photos of the types examined in this study: A, BM, C, G, GH, H, HAL, ILL, LE, MO, NY, S, and US. I especially thank the support of the curators Dr. Roger Vogt, Dr. Ib Friis, Dr. Nicholas Fumeaux, and Dr. Marc Jeanson, who have received me and provided access to the historical collections, making a very nice stay in their respective herbaria: Botanischer Garten und Botanisches Museum Berlin-Dahlem, Zentraleinrichtung der Freien Universität Berlin, Germany (B); Natural History Museum of Denmark, Copenhagen, Denmark (C); Conservatoire et Jardin Botaniques de la Ville de Genève, Geneva, Switzerland

(G & G-DC) & Muséum National d'Histoire Naturelle, Paris France, (P). Funding support for this research was provided by the Mexican Consejo Nacional de Ciencia y Tecnología (CONACYT) and from the Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). Dr. Marie-Stéphanie Samain, Dr. Jerzy Rzedowski, and two anonymous reviewers provided many useful comments, corrections and suggestions. Special thanks to Victor Steinmann.

## LITERATURE CITED

- Bornstein, A. J. 1989. Taxonomic studies in the Piperaceae-I. The pedicellate pipers of Mexico and Central America (*Piper* subgen. *Arctottonia*). *Journal of the Arnold Arboretum* 70: 1-55.
- Bornstein, A. and F. G. Coe. 2007. The genus *Piper* (Piperaceae) in Honduras. *Novon* 17: 11-19.
- Burger, W. C. 1971. Piperaceae. In: Burger, W. C. (ed.). *Flora Costaricensis*. Fieldiana, Botany 35: 5-218.
- Callejas, R. 2001. Piperaceae. In: Stevens, W. D., C. Ulloa, A. Pool and O. M. Montiel (eds.). *Flora de Nicaragua*. Monographs in Systematic Botany from the Missouri Botanical Garden 85: 1928-1984.
- De Candolle, C. 1869. Piperaceae. *Prodromus Systematis Naturalis Regni Vegetabilis* 16(1): 235-471.
- De Candolle, C. 1923. *Piperacearum Clavis Analytica*. Extract from *Candollea* 1: 65-415. Organe du Conservatoire et du Jardin botaniques de Genève. Genève, Switzerland.
- Frodin, D. G. 2004. History and concepts of big plant genera. *Taxon* 53: 753-776.
- Jaramillo, M. A., R. Callejas, C. Davidson, J. F. Smith, A.C. Stevens and E. J. Tepe. 2008. A phylogeny of the tropical genus *Piper* using ITS and the chloroplast intron *psbJ-petA*. *Systematic Botany* 33: 647-660.
- Kunth, K. 1839. Bemerkungen über die Familie der Piperaceen. *Linnaea* 13: 562-726.
- McNeill, J., F. R. Barrie, W. R. Buck, V. Demoulin, W. Greuter, D. L. Hawksworth, P. S. Herendeen, S. Knapp, K. Marhold, J. Prado, W. F. Prud'homme van Reine, G. F. Smith, J. H. Wiersema and N. Turland (eds. and comps.). 2012. *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code)*. *Regnum Vegetabile*. Vol. 154. Koeltz Scientific Books. Königstein, Germany. Accessed in 2016 on: <http://www.iapt-taxon.org/nomen/main.php?page=title>.
- Miquel, F. A. G. 1843-1844. *Systema Piperacearum*. Kramers, H. A. (ed.). Rotterdam, The Netherlands. 575 pp.
- Miquel, F. A. G. 1845. *Observationes de Quibusdam Piperaceis Herbarii Schlechtendaliani*. *Linnaea* 18: 710-716.
- Quijano-Abril, M. A., R. Callejas-Posada and D. R. Miranda-Esquivel. 2006. Areas of endemism and distribution patterns for neotropical *Piper* species (Piperaceae). *Journal of Biogeography* 33: 1266-1278.

- Ramírez A., J. M. 2013. Revisión taxonómica del género *Piper* (Piperaceae) en Michoacán, México. Tesis de maestría. Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo. Morelia, Michoacán, Mexico. 75 pp.
- Saralegui-Boza, H. 2004. Piperaceae. Flora de la República de Cuba 9(3): 1-94.
- Standley, P. C. 1920. Piperaceae. In: Trees and shrubs of Mexico. Contributions from the United States National Herbarium 23: 145-1561.
- Standley, P. C. and J. A. Steyermark. 1952. Piperaceae. In: Standley, P. C. and J. A. Steyermark (eds.). Flora of Guatemala - Part III. Fieldiana, Botany 24(3): 228-337.
- Steyermark, J. A. 1984. Piperaceae. Flora de Venezuela 2: 1-619.
- Tebbs, M. C. 1989. Revision of *Piper* (Piperaceae) in the New World. 1. Review of characters and taxonomy of *Piper* section *Macrostachys*. Bulletin of the British Museum (Natural History) Botany 19: 117-158.
- Tebbs, M. C. 1990. Revision of *Piper* (Piperaceae) in the New World. 2. The taxonomy of *Piper* section *Churumayu*. Bulletin of the British Museum (Natural History) Botany 20: 193-236.
- Tebbs, M. C. 1993. Revision of *Piper* (Piperaceae) in the New World 3. The taxonomy of *Piper* sections *Lepianthes* and *Radula*. Bulletin of the British Museum (Natural History) Botany 23: 1-50.
- Trelease, W. 1921. North American pipers of the section *Ottonia*. American Journal of Botany 8: 212-217.
- Trelease, W. 1935. The pedicellate peppers of South America. Proceedings of the American Philosophical Society 75: 691-716.
- Trelease, W. and T. G. Yuncker. 1950. The Piperaceae of northern South America. 2 Vols. University of Illinois Press. Urbana, Illinois, U.S.A. 838 pp.
- Yuncker, T. G. 1953. The Piperaceae of Argentina, Bolivia, and Chile. Lilloa 27: 97-284, plates 1-145.
- Yuncker, T. G. 1972. The Piperaceae of Brazil 1: *Piper* - group I, II, III, and IV. Hoehnea 2: 19-366, figs. 1-167.
- Yuncker, T. G. 1973. The Piperaceae of Brazil 2: *Piper* - group V; *Ottonia*, *Pothomorphe*, *Sarcorrhachis*. Hoehnea 3: 29-284, figs. 1-134.

Recibido en octubre de 2014.

Aceptado en mayo de 2016.